IBM High IOPS Modular Adapters

IBM Redbooks Product Guide

The new family of IBM® High IOPS Modular Adapters is the ultimate performance solution for embedded direct-attached storage for IBM System x®, IBM BladeCenter®, and IBM Flex System™. The offerings include 300 GB, 600 GB, and 800 GB Multi Level Cell (MLC) adapters and a 300 GB Single Level Cell (SLC) adapter. Designed to offer high performance with low latency and a low CPU burden, these adapters can improve the performance of applications regardless of the mix of reads and writes.

The IBM High IOPS Modular Adapters are built on the latest enterprise-level solid-state technologies and include sophisticated advanced features to help deliver consistently high levels of performance, endurance, and reliability under some of the most demanding conditions. The robust technology in these adapters helps optimize the number of program cycles to the flash storage, efficiently extending the rated endurance of flash storage.

The following figure shows an IBM High IOPS Modular Adapter.

Figure 1. IBM High IOPS Modular Adapter with the low profile bracket

Did you know

The IBM High IOPS Modular Adapters can be fully re-written up to 20 times per day (eMLC) or up to 140 times per day (SLC) throughout their entire five-year life time expectancy.

Providing additional peace of mind, these adapters are covered under IBM warranty. They carry a 1-year limited warranty, or when installed in a supported IBM server, these adapters assume your system's base warranty.

Part number information

Table 1 lists the information for ordering part numbers and feature codes.

Table 1. Ordering part numbers and feature codes

Description	Part number	Feature code
IBM 300GB High IOPS MLC Modular Adapter	90Y4361	A3MZ
IBM 600GB High IOPS MLC Modular Adapter	90Y4365	A3N0
IBM 800GB High IOPS MLC Modular Adapter	90Y4369	A3N1
IBM 300GB High IOPS SLC Modular Adapter	90Y4373	A3N2

The part numbers for the adapters include the following items:

- IBM High IOPS MLC Modular or SLC Modular Adapter with full height (3U) bracket attached
- Low profile (2U) bracket
- USB Key with the documentation and drivers
- Quick Install Guide
- Important Notices
- Warranty Flyer
- IBM Safety Information
- Technical Update Flyer

Features

The IBM High IOPS Modular Adapters use NAND flash memory as the basic building block of solid-state storage and contain no moving parts, thus are less sensitive to issues associated with vibration, noise, and mechanical failure. These adapters are built as block devices on a PCIe bus with advanced wear-leveling, ECC, and chip-level redundancy providing unparalleled reliability and efficiency.

Based on the standard PCIe architecture coupled with the modular NAND SLC and eMLC storage technologies, the High IOPS Modular Adapters are optimized for System x rack servers and can be deployed in blades through the PCIe expansion units.

Typical uses are applications with ultra high performance I/O needs, such as:

- Web serving
- Online transaction processing
- Data warehousing
- Business intelligence and analytics
- Decision support
- High performance computing

The IBM High IOPS Modular Adapters have the following features:

Technology features:

- Industry-standard PCIe form factor.
- Enterprise-grade NAND SLC and eMLC technology.
- Modular NAND flash architecture.
- Function as a PCIe storage and controller device. The operating system sees a block device.

Performance and reliability features:

- High performance of more than 200,000 read IOPS
- Access latency as low as 50 µs
- Up to 2 GBps of sustained sequential throughput
- Enterprise-grade SLC and eMLC
- 55-bit ECC protection per 512 bytes
- Block level and page level failure protection
- DuraWrite advanced wear leveling technology
- Dynamic Overprovisioning
- Advanced Read Disturb Management
- Recycler, Advanced Garbage Collection

Monitoring and management features:

- Overall health
- Thermal information
- Flash wear-out

Note: These adapters cannot be used as bootable devices.

Technical specifications

The following table presents the technical specifications for the IBM High IOPS Modular Adapters.

Table 2. IBM High IOPS Modular Adapter technical specifications

Specification	300 GB eMLC	600 GB eMLC	800 GB eMLC	300 GB SLC
Part number	90Y4361	90Y4365	90Y4369	90Y4373
Interface	PCIe 2.0 x8 (x8-wired)	PCIe 2.0 x8 (x8-wired)	PCIe 2.0 x8 (x8-wired)	PCIe 2.0 x8 (x8-wired)
Form factor	Full height*	Full height*	Full height*	Full height*
Capacity	300 GB	600 GB	800 GB	300 GB
Endurance	11.5 PB TBW	23 PB TBW	30.7 PB TBW	76.8 PB TBW
Sequential read IOPS (4 KB)	172,000	172,000	218,000	179,000
Sequential write IOPS (4 KB)	79,000	79,000	75,000	100,000
Sequential read rate (256 KB)	1.5 GBps	1.5 GBps	2.0 GBps	1.5 GBps
Sequential write rate (256 KB)	500 MBps	500 MBps	1.0 GBps	850 MBps
Access latency	50 µs	50 µs	50 µs	50 µs
Power requirements	25 W	25 W	25 W	25 W

* Low profile bracket is also included with the adapter.

The TBW value assigned to a solid-state device is the total bytes of written data (based on the number of P/E cycles) that a device can be guaranteed to complete (the percentage of remaining P/E cycles is equal to the percentage of remaining TBW). The IBM warranty for the solid-state storage is limited to devices that have not reached the maximum guaranteed number of program/erase cycles. Solid-state storage that reaches this limit might fail to operate according to its specifications. Because of such behavior by these devices, careful planning must be done to use solid-state storage in the application environments to ensure that the TBW of the device is not exceeded before the end of the required life expectancy.

Supported servers

The IBM High IOPS Modular Adapters can be installed in the System x and IBM iDataPlex® servers identified in Table 3 and the BladeCenter and Flex System servers identified in Table 4.

Table 3. Supported System x and iDataPlex servers (Part 1)

Part number	Feature code	Product description	x3200 M3 (7327, 7328)	x3250 M3 (4251, 4252)	x3400 M3 (7378, 7379)	x3500 M3 (7380)	x3550 M3 (7944)	x3620 M3 (7376)	x3630 M3 (7377)	x3650 M3 (7945)	x3755 M3 (7164)	dx360 M3 (6391)
90Y4361	A3MZ	IBM 300GB High IOPS MLC Modular Adapter	N	N	N	N	N	N	N	N	N	N
90Y4365	A3N0	IBM 600GB High IOPS MLC Modular Adapter	N	N	N	N	N	N	N	N	N	N
90Y4369	A3N1	IBM 800GB High IOPS MLC Modular Adapter	N	N	N	N	N	N	N	N	N	N
90Y4373	A3N2	IBM 300GB High IOPS SLC Modular Adapter	N	N	N	N	N	N	N	N	N	N

Table 3. Supported System x and iDataPlex servers (Part 2)

Part number	Feature code	Product description	x3100 M4 (2582)	x3250 M4 (2583)	x3300 M4 (7382)	x3500 M4 (7383)	x3530 M4 (7160)	x3550 M4 (7914)	x3630 M4 (7158)	x3650 M4 (7915)	x3690 X5 (7147)	x3750 M4 (8722)	x3850 X5 (7143)	dx360 M4 (7912)
90Y4361	A3MZ	IBM 300GB High IOPS MLC Modular Adapter	N	N	N	N	N	N	N	Y	N	N	Y*	N
90Y4365	A3N0	IBM 600GB High IOPS MLC Modular Adapter	N	N	N	N	N	N	N	Y	N	N	Y*	N
90Y4369	A3N1	IBM 800GB High IOPS MLC Modular Adapter	N	N	N	N	N	N	N	Y	N	N	Y*	N
90Y4373	A3N2	IBM 300GB High IOPS SLC Modular Adapter	N	N	N	N	N	N	N	Y	N	N	Y*	N

* Support is planned for 1Q/2013

Table 4. Supported BladeCenter and Flex System servers

Part number	Feature code	Product description	HS12 (8028)	HS22 (7870)	HS22V (7871)	HS23 (7875)	HS23E (8038)	HX5 (7873)	x220 (7906)	x240 (8737)	x440 (7917)
90Y4361	A3MZ	IBM 300GB High IOPS MLC Modular Adapter	N	N	N	Y†	N	N	N	N	N
90Y4365	A3N0	IBM 600GB High IOPS MLC Modular Adapter	N	N	N	Y†	N	N	N	N	N
90Y4369	A3N1	IBM 800GB High IOPS MLC Modular Adapter	N	N	N	Y†	N	N	N	N	N
90Y4373	A3N2	IBM 300GB High IOPS SLC Modular Adapter	N	N	N	Y†	N	N	N	N	N

† The HS23 supports these adapters with the addition of the IBM BladeCenter PCI Express Gen 2 Expansion Blade II, part number 68Y7484.

See the IBM ServerProven® website for the latest compatibility information for System x, BladeCenter, iDataPlex, and Flex System servers at http://ibm.com/servers/eserver/serverproven/compat/us/.

Supported operating systems

The IBM High IOPS Modular Adapters support the following operating systems:

- Microsoft Windows Server 2012
- Microsoft Windows Server 2008 R2
- Microsoft Windows Server 2008, Datacenter x64 Edition
- Microsoft Windows Server 2008, Enterprise x64 Edition
- Microsoft Windows Server 2008, Web x64 Edition
- Red Hat Enterprise Linux 6 Server x64 Edition
- Red Hat Enterprise Linux 5 Server x64 Edition
- Red Hat Enterprise Linux 5 Server with Xen x64 Edition
- SUSE Linux Enterprise Server 11 for AMD64/EM64T
- SUSE Linux Enterprise Server 11 with Xen for AMD64/EM64T
- SUSE Linux Enterprise Server 10 for AMD64/EM64T
- SUSE Linux Enterprise Server 10 with Xen for AMD64/EM64T
- VMware vSphere 5.1
- VMware vSphere 5
- VMware ESX 4.1
- VMware ESXi 4.1

See the IBM ServerProven website for the latest information about the specific versions and service packs supported at http://ibm.com/servers/eserver/serverproven/compat/us/. Click **System x servers**, then **Disk controllers** to see the support matrix. Click the check mark that is associated with the System x server in question to see the details of the operating system support.

Warranty

The IBM High IOPS Modular Adapters carry a 1-year, customer-replaceable unit (CRU) limited warranty. When installed in a supported IBM server, these adapters assume your system's base warranty and any IBM ServicePac® upgrade.

Physical specifications

The IBM High IOPS Modular Adapters have the following physical specifications:

Dimensions and weight (approximate):

- Height: 16 mm (0.6 in.)
- Width: 68 mm (2.7 in.)
- Depth: 168 mm (6.6 in.)
- Weight: 227 g (0.5 lb)

Shipping dimensions and weight (approximate):

- Height: 114 mm (4.5 in.)
- Width: 241 mm (9.5 in.)
- Depth: 318 mm (12.5 in.)
- Weight: 648 g (1.4 lb)

Operating environment

The IBM High IOPS Modular Adapters are supported in the following environment:

- Temperature (operational): 5 - 40 °C (41 - 104 °F) at 0 - 3,048 m (0 - 10,000 ft)
- Temperature (non-operational): -40 - 60 °C (-40 - 140 °F) at 0 - 10,700 m (0 - 35,105 ft)
- Relative humidity: 8 - 85% (non-condensing)
- Maximum altitude (operational): 3,048 m (10,000 ft)

Agency approvals

The IBM High IOPS Modular Adapters have the following agency approvals:

- UL
- cUL
- IEC60950
- EMC
- FCC
- TUV
- VDE
- CE
- VCCI
- BSMI
- C-tick
- MIC
- KCC

Related publications

For more information, see the following documents:

- IBM US Announcement Letter for the IBM High IOPS Modular Adapters:
  http://ibm.com/common/ssi/cgi-bin/ssialias?infotype=dd&subtype=ca&&htmlfid=897/ENUS112-213
- *IBM System x Configuration and Options Guide*:
  http://www.ibm.com/support/docview.wss?uid=psg1SCOD-3ZVQ5W
- IBM ServerProven:
  http://ibm.com/servers/eserver/serverproven/compat/us/

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This document was created or updated on November 20, 2012.

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